APGA – Equipment Enabling Hydrogen Infrastructure – Smaller Componentry

www.hifraser.com

Peter Andrews
General Manager, HIFraser

who we are

HIFraser Group

With facilities in NSW, VIC, QLD and WA, HIFraser Group is a partnership of highly specialised businesses.

We have been in operation for over 60 years.

HIFraser Group | HIFraser | AQUIP | AQUIP flowservices | PAC PIPELINE ACTUATION CONTROL | EA EASTERN AUTOMATION

PIPELINE ACTUATION CONTROL

Hydrogen Process Map

Turnkey solutions

ELECTROLYSIS
- Using proven PEM electrolyser technology
- Adapted locally and manufactured in Australia to meet Australian standards
- On-going maintenance and support

HYDROGEN & OXYGEN FILLING AND STORAGE
- Large range of bespoke gas storage solutions

Oxygen

Hydrogen

Green Electricity

H^2O

Electrolyser

H

Compressor

Hydrogen Storage

Dispenser

PORTABLE SOLUTIONS
- Containerised mobile refuelling modules
- Mobile compression and storage module

DISPENSING SOLUTIONS
- 35MPa & 70MPa
- Highest quality electronics and communications

COMPRESSOR UNITS
- Single Stage, Multi-stage and Hybrid machines

Gas Supply Network

GAS SUPPLY NETWORK
- Hydrogen injection panels designed and manufactured to meter and control the flow of hydrogen into existing natural gas piping networks

Hydrogen Component Standards

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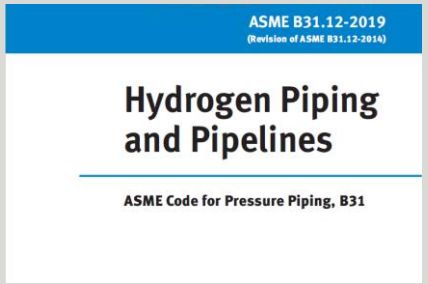
Reference Standards

- ASME B31.12 – Contains Design / Material Selection for Piping
  - Valves – API 6D and ASME B16.34 deemed compliant for H_2 service.
- NACE MR0175 / ISO 15156 – Applicable for Materials
- API 607 – Fire Test for Quarter Turn valves equipped with non-metallic seats



Recommended Practice

- EIGA IGC Doc 121.14 Hydrogen Pipeline Systems
  - Covers Valve Design, material compatibility
- AFPM Doc AM-12-50 Recommended Practice for Valves Used in Hydrogen Service
  - Covers Valve Design, Design to limit losses, metallurgy incl. high temp applications (API 941)

Other related hydrogen valve standards

- AS 19880.3:2020 Gaseous hydrogen – Fuelling stations, Part 3: Valves

H_2 Pipeline Ball Valves case study

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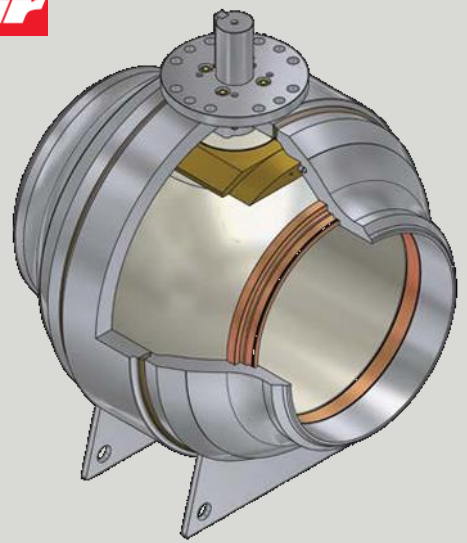
SNAM Blended Hydrogen Pipeline, Italy

- SNAM was the first energy company in Europe to use a mix of 5% (now increased to 10%) hydrogen by volume in its natural gas transmission network.
- Perar ball valves (Class 600, up to 24") validated through analysis of valve design and material compatibility.
- Wetted Materials: ASTM A350 Gr. LF2 and/or A182 F316.
- Actuators: Certified to IECEx IIC
- Tests:
  - 1.1 x MAWP pneumatic test with Helium
  - Fugitive Emission Test iaw ISO 15848-1
  - Cryogenic Test iaw BS6364 using Helium

Perar



Molecule		Molecular weight	Kinetic diameter (pm)
Name	Formula		
Hydrogen	H_2	2	289
Helium	He	4	260

H_2 Pipeline Ball Valves case study

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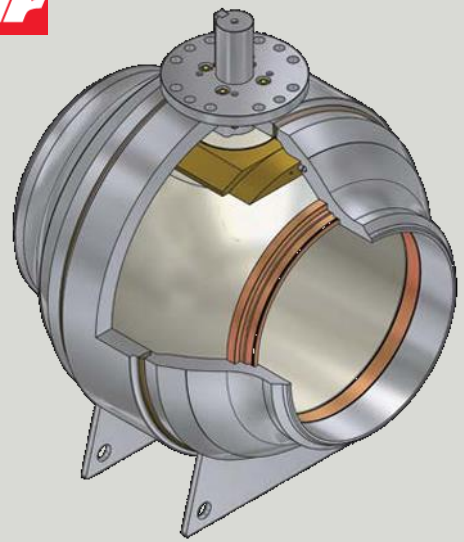
Humber Low Carbon Pipeline, UK

- National Grid planning two pipelines, one of which will be 100% Hydrogen up to 36" diameter and MOP 50-75 barg.
- Perar planning 100% hydrogen test (UK facility) to qualify valve for 100% H_2 service.
- Sealing supplier conducted 100% H_2 testing on materials from both static and cyclic 17 to 87MPa. Results confirmed suitability with 100% Hydrogen.
  - Checked for Density, modulus, compression, chemical changes, dimensional changes etc.

Perar



Hydrogen Ready Meters

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Coriolis

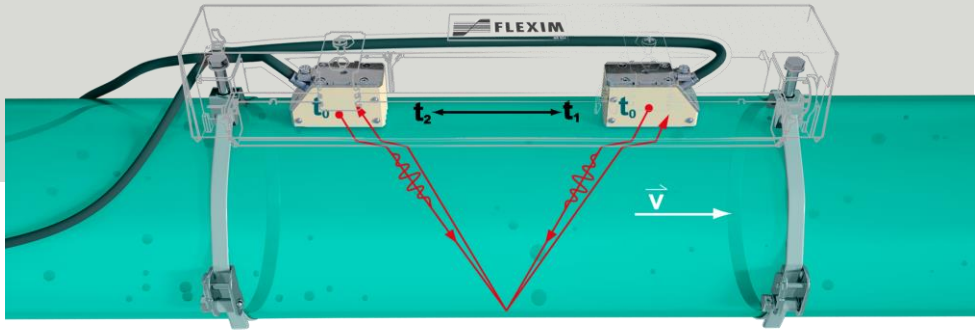
- NMI certified in NL for 100% H_2 refuelling stations.
- High accuracy over wide turndown.

In-line Ultrasonic

- Currently only used up to 20-30% H_2 blend.
- Material compatibility with H_2 to be overcome.

Clamp-on Ultrasonic

- No wetted parts.
- Could be a good, low cost retrofit of existing pipeline infrastructure.



Ultrasonic Meters case study

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DNV GL Joint Industry Project – 2020-2021

- Group of USM Manufacturers and User Groups.
- 8” CS pipe, 0% to 30% H_2 NG blend.

Results:

- Up to 20% H_2 both in-line and clamp-on USM’s performed well and within specifications.
- At 30% H_2 some impacts on accuracy in some meters.

Ultrasonic Meters case study

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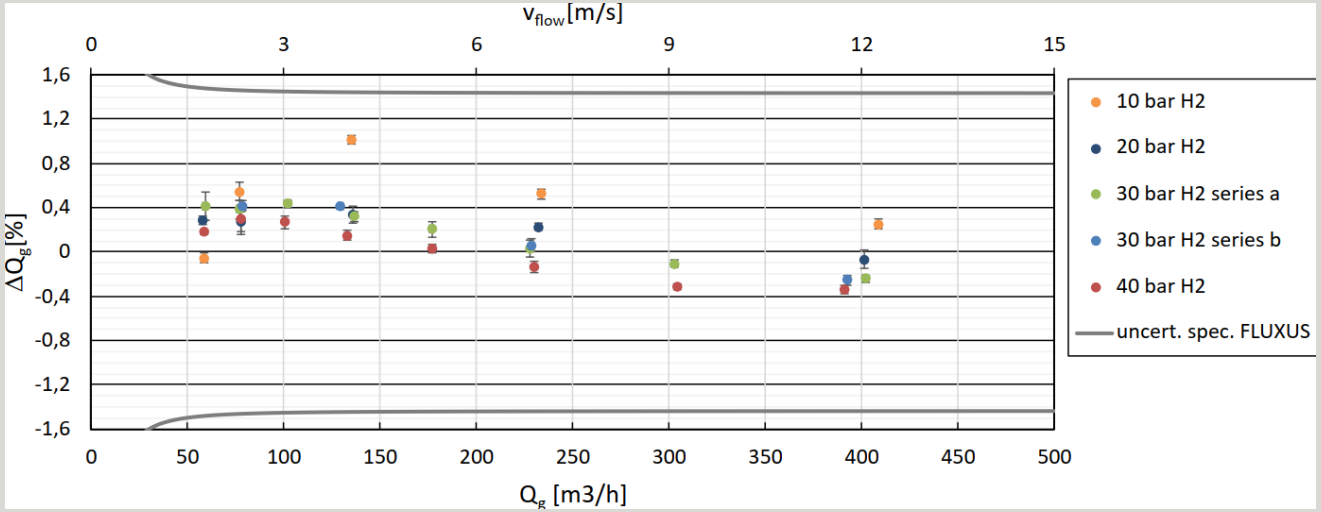
DNV HyLoop facility in Groningen – 100% H_2 test

- Flexim Clamp-on USM, 4" CS pipe

Results:



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Thank You

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